

GIANT-CELL SARCOMA OF FOREARM; PRO-  
FOUND ANÆMIA FROM HEMORRHAGE; DIS-  
ARTICULATION AT THE ELBOW BY MILLER'S  
MODIFICATION OF THE CIRCULAR METHOD  
UNDER LOCAL ANÆSTHESIA.

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MRS. T., colored, married, aged 26 years, was admitted to the service of J. William White in the University Hospital on account of a large tumor of the forearm March 26, 1908, when the following notes were made:

The patient's maternal grandmother and some of her aunts died of tuberculosis. Otherwise the family history is negative. There is no history of tumors in the family.

She had the usual diseases of childhood, since which time she has never been ill. Although of frail build, she has always been able to attend to her duties about the house.

She is the mother of three children; one is living and in good health, one died in infancy, and one, born at seven months, died at birth. There is no history of venereal infection, and there have been no miscarriages. Her husband has always been healthy.

The present trouble began in the winter of 1905 with pain in the left wrist, which was thought to be due to rheumatism. The pain continued for some time. By the following May the symptoms had largely disappeared, but at this time she fell and struck the left forearm. Two weeks later, while sweeping, the handle of the broom caught on a nail, and the left wrist was severely sprained. After this the wrist began to swell, and became very painful. Her physician told her she had a fracture, for which a plaster-of-Paris cast was applied. When the cast was removed the wrist was worse and soon became more swollen than at any previous time. In August, as the pain and swelling persisted, an operation was performed, and two and one-half inches of the radius were removed on account of necrosis (?). The wound healed very slowly and by February, 1906, seemed about well.

Very soon, however, a small swelling developed at the site of the former operation. This was opened; the wound apparently healing satisfactorily, and again she thought she had about recovered. In August (1906) the present swelling began as a small lump in the seat of the previous operation, and has steadily enlarged until it reached the present size. The cicatrix broke down, leaving a raw surface and the skin became ulcerated from pressure. From both of these a varying amount of discharge appeared, and from time to time hemorrhages occurred. The one next to the last was very free, and the last one was so profuse that the patient fainted from loss of blood. The pain has been only moderate, but the tumor is tender to pressure. Daily dressings have been required for some time.

The patient is a thin, anæmic, light, colored woman, looking quite ill. Pulse, 100 to 130; temperature, 99° to 103°. The lungs and heart are normal. The urine contains albumin and a few hyaline casts. Hæmoglobin 20 per cent. (?), red blood corpuscles, 2,600,000; white blood corpuscles, 18,000.

The surface veins of the left forearm are very much distended. The tumor consists of four distinct lobes, one internal, two external and a very large and sloughing mass posteriorly. The odor is very foul. The tumor is soft, at points almost fluctuating and somewhat tender. No bruit is heard over the tumor, but a distinct thrill is felt along the axillary and brachial arteries, most pronounced at the level of the neck of the humerus. There is no glandular involvement.

A diagnosis of sarcoma was speedily reached. An early amputation seemed imperative on account of the recent copious bleeding and the danger of a fatal hemorrhage at any time. On the other hand, the profound anæmia (hæmoglobin 20 per cent.) and the marked degree of exhaustion, in a person naturally delicate and frail led to a fear that any operation might result fatally. After careful consideration of all of the factors, a disarticulation at the elbow joint under local anæsthesia was decided upon. This was done by the writer at Dr. White's clinic on April 1, 1908. In order to save time the simplest possible technic was required, and with this point in mind Dr. White suggested Miller's modification of the circular method. This is described in Jacobson and Rowland's "Operations of Surgery," 5th edition, 1908, with the following comments:

W. H. O.

FIG. 2.



Sarcoma of forearm, lateral view.

FIG. 2.



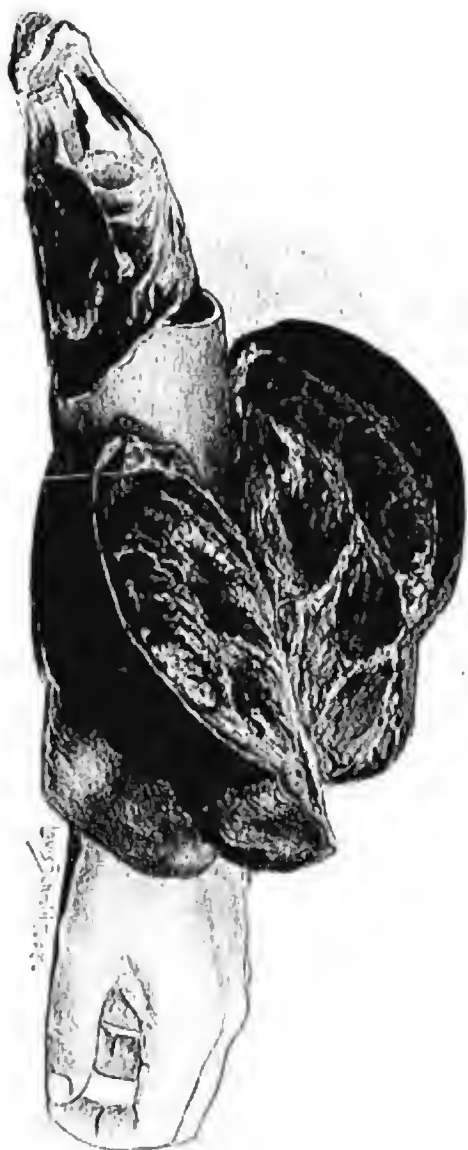
Sarcoma of forearm, dorsal view.

FIG. 3.



X-ray of sarcoma of forearm.

FIG. 2.



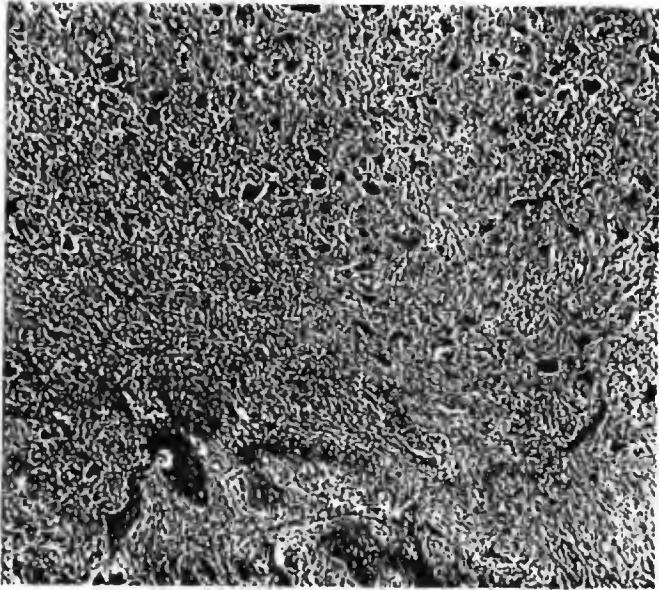
Section through tumor showing cross structure.

FIG. 5.



Showing stump two weeks after operation.

FIG. 6.



Microscopic section of giant-cell sarcoma. Low power.



"Mr. A. G. Miller, of Edinburgh, relying on Desault's dictum,—that, the simplicity of an operation is the measure of its perfection,—recommends disarticulation at the elbow and knee by a method which secures a long single flap by a circular cut. The whole point and simplicity of the procedure depends on the well-known tendency to contraction of the structures on the flexor aspect of a limb, as compared with those on the extensor, after the tissues are divided. At the elbow and knee this tendency is increased by extending the joint, and thus putting the skin on the flexor aspect on the stretch, while the skin on the extensor surface is completely relaxed. The method of procedure is as follows: The limb being held out quite straight, a circular incision is made  $1\frac{1}{2}$  inches below the condyles down to the deep fascia. The skin on the anterior or flexor aspect at once retracts considerably, making the line of incision oblique.

"The extensor flap is now dissected up as far as above the olecranon, care being taken to cut on the deep fascia, and so to reflect the subcutaneous deep fascia, and its contained blood-vessels along with the skin. The flap is loose and ample, being taken from a part where the skin is naturally redundant in order to accommodate itself to the normal action of flexion. After reflection of this flap—practically the only one—disarticulation should be performed from the front. It will then be found that there is a long flap on the extensor and posterior aspect, with practically no flap upon the flexor aspect. After the blood-vessels are secured and the nerves cut short, this single flap falls nicely over the condyles; and is easily secured by sutures.

"Mr. Miller has proved by special dissections made by Mr. Whitaker that the vascular supply to the extensor surface of the arm is remarkably good. Two large vessels are supplied to the skin here; one, on the inner aspect, from the inferior profunda and anastomotica; the other, on the outer, from the superior profunda, both running in the subcutaneous cellular tissue.

"With regard to the objection that the cicatrix in a circular amputation is usually central and apt to adhere to the end of the bone, Mr. Miller replies that in his modification the cicatrix cannot be central. It is well up on the flexor aspect, and there is no chance of its becoming adherent to the bone.

"He claims the following advantages for his method: (1) The procedure is simple, is easily and quickly performed, and there are no elaborate details to remember. (2) The skin-flap from the extensor surface is well accustomed to pressure and to the situation in which it is ultimately placed over the condyles. (3) The scar is in a most favorable position. (4) Much tissue is not required. The operation is, therefore, made suitable for both primary and secondary amputations."

In the case here described the skin was infiltrated circularly with a one-half per cent. cocaine solution three inches below the joint (it was felt that an inch and a half below the joint as recommended would not give sufficient flap), the incision made

and the skin turned up in the manner prescribed. The nerves were then rapidly infiltrated with a 4 per cent. cocaine solution and the disarticulation performed. Slight pain was felt when the median nerve and deep muscles were divided, otherwise the operation was painless and was very well borne. No blood was lost, and throughout the pulse was not affected in the slightest degree. The operation required but twenty minutes from start to finish, a most satisfactory stump resulted, and all the claims made by Mr. Miller for this method seemed justified by the result in this case.

The patient made a rapid recovery. The day following the operation the temperature was normal for the first time since admission, and only once did it reach 99° after operation. The bruit and thrill disappeared permanently.

The stitches were removed and the patient was permitted to leave her bed on the fourth day. She was discharged on the sixteenth day, very much improved in appearance and strength.

The following pathological report was very kindly furnished by Dr. George P. Muller:

"Specimen consists of a forearm and hand; in the region of the wrist is a large tumor growing at an angle of about 45 degrees with the plane of the forearm. The tumor mass in its greatest diameter measures 17 cm. x 9 cm. The superior surface is ulcerated and presents a black, roughened surface which in many places is markedly indurated. The consistency is variable; that of the upper two-thirds of the growth being considerably less than the lower one-third, and indeed on the ulnar side fluctuation is apparent. In certain areas, particularly that portion immediately surrounding the joint, the density is very hard and resembles bony growth. Longitudinal section through the dorsal tumor displays a mottled, dirty grayish and reddish colored surface which, as the knife is drawn through it, is cut in certain areas with a grating sensation as though bone were present. In other areas necrosis is probably present, judging from the soft friable character of the tumor mass.

"Microscopical examination reveals a mass of cells, atypical in appearance, irregularly arranged, and in shape, round, spindle and giant. There are about 15 giant cells to every field, many of them large sized and containing eight or ten nuclei. The stroma is abundant, and such blood-vessels as are present seem to be formed directly by the tumor tissue. Some free hemorrhage is present."

*Pathological Diagnosis.*—Giant-cell sarcoma.